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METHOD AND WIRELESS TRANSCEIVER FOR REQUESTING AND
PROCESSING INFORMATION

Background Information

The present invention is based on a method according to the definition of the species of the main claim and on a wireless transceiver according to the definition of the species of alternative independent Claim 13. World Patent 98/26395 describes a method for traffic information in which data is transmitted upon request and/or automatically between a central unit and a mobile subscriber unit, and in which the data contains traffic information which is output upon request and/or automatically by the mobile subscriber unit to the subscriber.

Advantages of the Invention

The method according to the present invention having the features of the main claim and the wireless transceiver according to the present invention having the features of alternative independent Claim 13 has the advantage over the related art that information queries transmitted by a wireless transceiver to a service provider and the information returned by the service provider are provided with predefined validity time values. Thus the maximum time period for obtaining information can be calculated even when no data selection connection or the like is possible or convenient.

The measures cited in the subclaims describe advantageous refinements and improvements of the method described in the main claim and of the wireless transceiver described

in the alternative independent claim.

It is advantageous that the information queries are transmitted as short messages over a wireless network, in particular a mobile wireless network, for example, and that the information queries are provided with a first validity time value. When the validity time value is exceeded but the information query has not yet been transmitted to the service provider, the information query is automatically deleted in the wireless network and thus it cannot initiate any information to be returned by the service provider. This contributes to simplified error processing of the method according to the present invention and in a simplified design of the wireless transceiver according to the present invention. Furthermore, it is advantageous that the returned information is also received in the form of short messages, SMS messages in accordance with the GSM standard in particular, the returned information being provided with a second validity time value by the service provider which also contributes to simplified error processing, in particular in the case of communication disturbances.

It is advantageous that the wireless transceiver includes means for determining its position, in particular in a road network. Thus information queries can be requested depending on the position of the wireless transceiver.

It is particularly advantageous that information queries are generated on the basis of the position of the wireless transceiver. Thus, obtaining information is simplified, for example, reducing the amount of information to be transmitted.

Furthermore, it is particularly advantageous that a message is generated in the wireless transceiver and/or

the use of the information returned by the central station to the wireless transceiver is suppressed if a first predefined time period has been exceeded after the first information query has been transmitted. This makes
5 it possible to respond to the fact that information was received with a delay, for example, by calling a user's attention to this fact and/or by ignoring the returned information, for example, if this information has become obsolete and therefore no longer relevant due to a long
10 time delay in the transmission of information for processing, for example, for the navigation of a motor vehicle.

It is particularly advantageous that, after a first information query, a second subsequent information query is automatically transmitted after a second predefined time period has been exceeded, the second predefined time period being started at the time of the first information query, the first predefined time period which causes the returned information to be suppressed after it has been exceeded being restarted at the time of the second information query, and the second predefined time period being greater than the first predefined time period. This makes it possible to send out information queries
25 repeatedly and to keep the information processing, for example, for calculating the most favorable route of a vehicle in the presence of traffic problems on certain road segments, permanently up-to-date through the returned information. Furthermore, by using automatic
30 information queries, it is also possible to keep the processed information constantly up-to-date without user intervention, resulting in a higher degree of operating reliability of the method according to the present invention and the wireless transceiver according to the
35 present invention for requesting and processing information, in particular when the user is performing some activity, for example, driving a vehicle.

Furthermore, it is advantageous in another embodiment of
the method according to the present invention and the
wireless transceiver according to the present invention,
that a second information query following the first
information query in time is transmitted upon user
request, the first predefined time period being restarted
at the time the second information query is issued. Thus
an information query can be sent upon user request, which
may be desirable in the event of unexpected changes in
the situation, for example, a change in destination. In
addition, the number of information queries in the case
of an information query upon user request can be kept
lower and information queries can be transmitted in a
controlled manner, for example, before a decision to be
made, in particular regarding road conditions, resulting
in reduced telecommunications traffic and reduced costs
when the information queries are associated with costs.

Furthermore, it is advantageous if the returned
information contains traffic situation reports, in
particular according to the TMC standard, and the traffic
situation reports preferably relate to one or more
specific areas. Thus only those traffic situation reports
are taken into consideration in the wireless transceiver
which, for example, are or may become relevant for the
navigation to be performed, since they concern areas
which correspond to areas queried in the information
query or are adjacent thereto, for example.

Furthermore, it is advantageous that the life of the
traffic situation reports exceeds a predefined minimum
life. The traffic situation reports contained in the
returned information are therefore received in all cases.

In a particularly advantageous embodiment of the method
according to the present invention and the wireless
transceiver according to the present invention, the

5 predefined minimum life of the traffic situation reports
is greater than the sum of the predefined first time
period and the predefined second time period. Traffic
situation reports contained in returned information can
thus not be ignored because of their excessively short
life alone during information processing. Thus no short-
term loss of traffic situation reports occurs in the
wireless transceiver in the case of a time spread in
obtaining the messages, which is not critical in and of
10 itself.

15 Furthermore, it is advantageous if a number of
appropriate and relevant traffic situation reports is
selected from the amount of traffic situation reports
received, and is made available to a processing unit, in
particular a navigation unit. This can reduce the
processing costs by concentrating on the relevant traffic
situation reports, making processing speedier, allowing
the hardware and the software to be kept simpler, thus
reducing costs.
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25 It is furthermore advantageous that the wireless
transceiver includes a memory in which received traffic
situation reports can be stored. Thus the traffic
situation reports can be read individually from returned
information. The traffic situation reports can be used
without all the returned information being fully
available in the case of a plurality of returned
information items received by the wireless transceiver.
30 The method according to the present invention and the
wireless transceiver according to the present invention
compatible with receiving traffic situation reports via a
unidirectional communication channel, for example, via
radio, broadcast SMS, or the like. Furthermore, traffic
situation reports can thus be used in a practical manner
35 when the respective returned information is not fully
available

Another advantage of the wireless transceiver according to the present invention is that the wireless transceiver includes means for selecting navigation messages from the traffic situation reports and for making them available to a navigation unit. This reduces the resources needed in the navigation unit.

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Drawing

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Embodiments of the present invention are illustrated in the drawing and elucidated in detail in the description that follows.

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Figure 1 shows a block diagram of a wireless transceiver;

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Figure 2 shows a transmit/receive diagram according to a first embodiment of the method according to the present invention and the mode of operation of the wireless transceiver according to the present invention between the wireless transceiver, a wireless network, and a service provider, and

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Figure 3 shows a transmit/receive diagram according to a second embodiment of the method according to the present invention and the mode of operation of the wireless transceiver according to the present invention between the wireless transceiver, a wireless network, and a service provider.

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Description of the Exemplary Embodiments

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Figure 1 shows a block diagram of a wireless transceiver 100. Wireless transceiver 100 includes a transceiver unit 110, which is connected to an analyzer circuit 120. Analyzer circuit 120 is connected to a distributor device 140. Furthermore, a memory 142, a navigation unit 160,

playback devices 184, and input devices 182 are connected to distributor device 140. Navigation unit 160 is also connected to a navigation data memory 162. Transceiver unit 110 can be designed, in particular, so that it includes a receptacle for a portable telecommunications terminal, for example, a cell phone, so that transceiver unit 110 cannot be operated until the portable telecommunications terminal is connected to transceiver unit 110, for example, plugged in or the like. The different units and devices of wireless transceiver 100 can be distributed among different housings or integrated in a single housing. In particular, individual units and devices of wireless transceiver 100 can be combined with an additional device in a housing. Thus, for example, input devices 182 and playback devices 184 can be integrated into a wireless receiver. In this case the wireless receiver is connected to wireless transceiver 100 via a wire-bound or wireless connection, for example, a CAN bus or the like. The wireless receiver is provided with a decoder for traffic situation reports, in particular, according to the RDS-TMC system, so that the traffic situation reports can be received by the wireless transceiver via the link between the wireless transceiver and the radio receiver.

Figure 2 shows the communication process over time according to a first embodiment of the method according to the present invention and the mode of operation of wireless transceiver 100 according to the present invention between a wireless transceiver 100, a wireless network 50, and a service provider 10 with the aid of a transmit/receive diagram. A first information query 1000 is transmitted by wireless transceiver 100 to wireless network 50 to be forwarded to service provider 10. First information query 1000 is provided by wireless transceiver 100 with a first validity time value 1402. First validity time value 1402 causes first information

query 1000 no longer to be able to be transmitted to service provider 10 after the lapse of first validity time value 1402. If first information query 1000 was not transmitted to service provider 10 over wireless network 50 during the time period of first validity time value 1402, first information query 1000 is lost.

When first information query 1000 has been successfully transmitted to service provider 10, service provider 10 processes the contents of first information query 1000 and, after a certain processing time, returns one or more items of information 1100 to wireless transceiver 100 over wireless network 50. Service provider 10 provides returned information 1100 with a second validity time value 1403, which specifies the time period during which returned information 1100 is kept available in network 50 for transmission to wireless transceiver 100. If returned information 1100 is held available in wireless network 50 during a time period specified by second validity time value 1403 without returned information 1100 being transmitted to wireless transceiver 100, returned information 1100 is lost. If returned information 1100 is transmitted to wireless transceiver 100 within a time period specified by second validity time value 1403, wireless transceiver 100 can process returned information 1100. This takes place if first predefined time period 1401 has not been exceeded since the time when first information query 1000 was registered. If returned information 1100 was not received until after the lapse of first predefined time period 1401 after first information query 1000 was issued by wireless transceiver 100, a message is generated and/or processing of information 1100 which was returned too late is suppressed. The message can be forwarded in wireless transceiver 100 via distributor device 140 to playback devices 184 and output to a user there. It is furthermore possible to forward the message to navigation unit 160 or

the like.

According to the method according to the present invention and the wireless transceiver 100 according to the present invention, it is also possible that a second information query 1001 following first information query 1000 in time is transmitted by wireless transceiver 100 to service provider 10 over wireless network 50. Second information query 1001 can be issued due to a plurality of events, for example, automatically or also upon user request.

Second information query 1001 is transmitted automatically when a second predefined time period 1404 is exceeded. Second predefined time period 1404 is started at the time of first information query 1000. First predefined time period 1401 is restarted at the time of second information query 1001. Furthermore second predefined time period 1404 is greater than first predefined time period 1401. When information queries 1000, 1001 are automatically repeated, any desired number of additional information queries, which may have different contents, can be transmitted. Between two successive information queries 1000, 1001, the earlier information query is referred to as first information query 1000 and the subsequent information query is referred to as second information query 1001. First and second predefined time periods 1401, 1404 are both started at the time of first information query 1000. Since first predefined time period 1401 is smaller than second predefined time period 1404, first predefined time period 1401 ends while second predefined time period 1404 continues. After the lapse of second predefined time period 1404, second information query 1001 is issued and both the first and second predefined time periods 1401, 1404 are restarted.

Figure 3 shows the communication process over time according to a second embodiment of the method according to the present invention and the mode of operation of wireless transceiver 100 according to the present invention between a wireless transceiver 100, a wireless network 50, and a service provider 10 with the aid of a transmit/receive diagram. The same reference symbols from Figure 2 refer to essentially identical segments of the method. Information queries 1000, 1001 can also be initiated by a user request 1821. Between two successive information queries 1000, 1001, the earlier information query is again referred to as first information query 1000 and the subsequent information query is referred to as second information query 1001. Since user request 1821, rather than second predefined time period 1404 being exceeded, is used as a criterion for initiating second information query 1001, the second predefined time period does not have to be started at the time of first information query 1000 in the present embodiment. At the time of first information query 1000, only first predefined time period 1401 must be started and it must be restarted when second information query 1001 is issued.

Wireless transceiver 100 according to the present invention is suitable for performing the method according to the present invention. Transceiver unit 110 transmits first information query 1000 over wireless network 50 to service provider 10. In a first timer assigned to analyzer circuit 120, a first clock is started when first information query 1000 is issued by transceiver unit 110. Returned information 1100 is analyzed by the analyzer circuit. The contents of returned information 1100 can be stored in memory 142 using distributor device 140. Navigation unit 160 calls up data stored in memory 142 via distributor device 140 to update the data stored in navigation data memory 162. If transceiver unit 110

receives returned information 1100 and, after comparison with the clock of the first timer, it is determined that the first predefined time period 1401 has been exceeded, the message is generated and/or forwarded by distributor device 140 for use by other units or devices of wireless transceiver 100.

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Results of the information processing in navigation unit 160 can be forwarded to playback devices 184 via distributor device 140 and made available there to a user of any type, visually or acoustically in particular.

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The user inputs information via input devices 182, for example, a keyboard, for example, to have the wireless transceiver input navigation destinations and the like. Furthermore, the information about user request 1821 can be forwarded to a second information query 1001 via distributor device 140 to transceiver unit 110 using inputs devices 182. Transceiver unit 110 then transmits second information query 1001.

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In the case where wireless transceiver 100 is set to automatically repeat information queries 1000, 1001, it can be determined by comparing a clock of a second timer assigned to analyzer circuit 120 that second predefined time period 1404 has been exceeded, the clock of the second timer having been restarted at the time of the transmission of first information query 1000. In this case, second information query 1001 is transmitted by transceiver unit 110.

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Any number of returned information items 1100 can be received by the wireless transceiver in response to an information query 1000, 1001. This simplifies transmission and reception since it is not necessary to check for completeness. Processing of additional returned information 1100 takes place in the manner similar to the

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5 processing of returned information 1100 after the transmission of first information query 1000. Information transmitted by service provider 10 which does not originate from an information query 1000, 1001 of wireless transceiver 100 can also be processed by the wireless transceiver. In particular, important information such as traffic situation reports regarding a vehicle being driven in the wrong direction on a highway may be transmitted in such a mode of operation.

10 The method according to the present invention and wireless transceiver 100 according to the present invention can be used for requesting and processing any type of information. In particular, the method according to the present invention and wireless transceiver 100 according to the present invention are well suited for navigation information which facilitates navigation for a mobile user. In particular, the method according to the present invention and wireless transceiver 100 according to the present invention are well suited for use in a vehicle on land, water, or in the air. In the following, a particularly advantageous embodiment of the method according to the present invention and of wireless transceiver 100 according to the present invention for use in a land vehicle mainly on roads is described. For 15 navigation in a road network it is recommended that the location information and the possible connection options provided by the road network be stored in the road vehicle, which is made possible according to the present invention by storing first location information, in particular static information about the road network, in 20 navigation data memory 162.

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Navigation unit 160 according to the present invention includes means for determining the position of the vehicle at any time, for example, in regular time intervals. This is accomplished according to the present

invention through analyses of a GPS system (Global Positioning System). Furthermore, additional data sources can be used for position determination, in particular velocity data, angle or orientation data, or the like. Velocity data can be provided by an onboard velocity sensor. Angle or orientation data can be provided, for example, by an angular acceleration sensor or the like. Navigation is made possible, in particular for users familiar with the area, through the possibility of location determination and the presence of stored first location information of the road network.

By supplementing the first location information of the road network with up-to-date information, for example, concerning the traffic conditions on certain stretches of road, improved navigation becomes possible, which allows time-optimized navigation in particular. For this purpose, information from service provider 10 is transmitted over wireless network 50 to wireless transceiver 100 located in the vehicle. The wireless network is designed, for example, as a bidirectional wireless network, in particular of the type of a mobile telephone network according to the GSM standard. Service provider 10 receives information queries 1000, 1001 of wireless transceiver 100 and transmits information 1100, in particular for payment.

In the exemplary embodiments, communication takes place over wireless network 50 between wireless transceiver 100 and service provider 10, in particular via short messages, for example SMS short messages according to the GSM standard or the like. Service provider 10 selects returned information 1100 from the information available, for example, concerning disturbances in the traffic flow in the road network or the like, as a function of information queries 1000, 1001. In the method according to the present invention, information queries 1000, 1001

contain second location information, for example, regarding the position of the vehicle, the areas on the intended route, or the like. In particular, second location information may also be generated by wireless transceiver 100 on the basis of first location information. For example, when two different routes are considered in the navigation unit for optimizing navigation, the second location information of the respective information query 1000, 1001 can be configured so that returned information 1100 contains all traffic situation reports 1200 concerning the relevant road segments. Thus, the second information can also be generated on the basis of the position of wireless transceiver 100 and, at the same time, on the basis of the first information.

Using the second location information, service provider 10 can put together the information requested and make it available to wireless transceiver 100 as returned information 1100. In particular, information queries 1000, 1001 concern areas in the extended vicinity of the stretches of the intended route.

25 Returned information 1100 may include one or more traffic
situation reports 1200. Traffic situation reports 1200
may be transmitted in an encoded or unencoded form.
According to the present invention, traffic situation
reports 1200 are encoded according to the TMC (Traffic
Message Channel) code, which is defined in European
30 preliminary standard ENV-278-4-1-0012, June 1996.

In the present embodiment, the service provider evaluates information queries 1000, 1001 using the second location information and compares the latter with the available traffic situation reports, in particular TMC messages or the like. If a TMC message corresponds to the second location information of information query 1000, 1001, it

is forwarded in the form of an SMS short message to wireless transceiver 100. A plurality of TMC messages can be transmitted in an SMS short message. TMC messages concern third location information (Location according to the TMC code) which is determined by fourth location information (PrimaryLocation, see TMC standard) and the extent of the traffic disturbance (Extent, see TMC standard). A TMC message corresponds to the second location information when the third location information indicates point locations (Point Location, see TMC standard) and at least one of the third location information items affected by the TMC message is located in the area defined by the second location information of the information query. All the third location information items which are defined by the fourth location information and the extent of the traffic disturbance are affected by a message; the extent of disturbance may assume values between 0 and 31; thus, point locations may also be affected by a message 32.

The service provider may optimize its service quality by placing particularly important traffic situation reports 1200 at the beginning of returned information 1100. Less important traffic situation reports 1200 can be placed at the end of returned information 1100 or transmitted in additional returned information 1100 to wireless transceiver 100. Furthermore, the service provider may reduce the complexity of its queries by keeping a limited amount of predefined queries available and calling them up on the basis of the queried second location information. Such an option exists as long as all the traffic situation reports 1200, rather than a predefined first number of traffic situation reports 1200, affected by the queried second location information are selected. In an advantageous embodiment, the wireless transceiver according to the present invention may store only a predefined first number of, for example, one hundred,

traffic situation reports. Thus an overflow occurs in the
memory for traffic situation reports 1200 in wireless
transceiver 100 if the service provider returns a larger
number of traffic situation reports than the predefined
first number. Wireless transceiver 100 does not recognize
that traffic situation reports 1200 are also transmitted
from areas outside the regions contiguous to second
location information. All traffic situation reports 1200
contained in returned information 1100 are treated in the
same way in wireless transceiver 100.

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The service provider has the option of transmitting
traffic situation reports 1200 once queried and
transmitted, to wireless transceiver 100 without a new
information query 1000, 1001. Thus, changes in the
contents of traffic situation reports 1200 can also be
communicated without a new information query 1000, 1001.
It is, however, not ensured that traffic situation report
1200 is also received and evaluated by wireless
transceiver 100. The service provider does not transmit
any traffic situation reports 1200 whose life is less
than a predefined minimum life 1220. Life 1240 of a
traffic situation report 1200 can be represented, for
example, by the ALERT-C-Persistence which is defined in
the TMC code. In the method according to the present
invention, minimum life 1220 is set at 30 minutes.

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In order to counteract the danger of obsolete traffic
situation reports stored in wireless transceiver 100, the
service provider may terminate traffic situation reports
1200 whose life 1240 has been exceeded not by automatic
deletion after the lapse of life 1240, but through an
explicit delete message. Delete messages are also traffic
situation reports 1200 according to the TMC standard and
also have a life 1240 at least equal to minimum life
1220. Delete messages themselves can be removed after the
lapse of life 1240 without any comments.

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The service provider encodes returned information 1100 so
that they have validity in wireless network 50 only for a
period of time corresponding to a first validity time
value 1402. According to the present invention, returned
information 1100 is transmitted as an SMS short message
according to the GSM standard, for example, to wireless
transceiver 100. According to the GSM standard, an SMS
short message can be provided with a validity time value
5 (TP Validity-Period, see GSM standard document RE/SMG-
040340PR4, October 1996). The validity time value of an
SMS message may vary for a validity time value of up to
10 12 hours in multiples of five minutes in a certain
encoding of the validity time value. For example, with
the method according to the present invention and with
wireless transceiver 100 according to the present
invention, first validity time value 1402 is set at five
15 minutes.

A buffer memory assigned to transceiver unit 110 can be
provided in order to store returned information 1100
until analyzer circuit 120 is capable of evaluating
returned information 1100 and traffic situation reports
1200 contained therein. A first processing of returned
information 1100 takes place in analyzer circuit 120,
where traffic situation reports 1200 can be decoded. The
20 traffic situation reports 1200 can either be stored in
memory 142 or, at least in part, output to the user with
the aid of playback device 184 via distributor device
140.

Distributor device 140 recognizes in wireless transceiver
100 according to the present invention which traffic
situation reports 1200 are relevant for navigation using
signals of navigation unit 160 and sends these messages
30 to navigation data memory 162 via navigation unit 160 as
navigation messages 1300. On the basis of the information
35 present in navigation data memory 162, both the first

location information, in particular information concerning the road network, as well as the data from navigation messages 1300, the optimum route, which can be optimized in particular in terms of time, can be calculated in navigation unit 160.

5 In the present embodiment, first predefined time period 1401 is set at 13 minutes, for example. Second predefined time period 1404 which, when exceeded, causes second information query 1001 to be transmitted by wireless transceiver 100 is set in the present embodiment at 15 minutes, for example. Thus the condition that first predefined time period 1401 is less than second predefined time period 1402 is met. First and second validity time values 1402, 1403 are set at five minutes, for example.

10 15 20 Minimum life 1220 is set in the present embodiment at 30 minutes. Thus the condition that the minimum life is greater than the sum of first predefined time period 1401 and second predefined time period 1404 is met.

25 30 35 Returned information 1100 may reach wireless transceiver 100 either after first predefined time period 1401 after first information query 1000 has been transmitted or after second predefined time period 1404, so that returned information 1100 which was generated by service provider 10 on the basis of first information query 1000 is only received after second information query 1001 has been transmitted by wireless transceiver 100. As a result, first predefined time period 1401 was restarted by second information query 1001 and returned information 1100 belonging to first information query 1000 is assumed to be valid. This error cannot be recognized. It has a beneficial effect if traffic situation reports 1200 contained in returned information 1100 are not obsolete. Since returned information 1100 should be stored in the

wireless network according to second validity time value
1403 at the most, the likelihood that these traffic
situation reports are current is high. In normal
operation, the likelihood that traffic situation reports
are available earlier in such a case is also high. The
occurrence of errors may have an advantageous effect on
the operation of wireless transceiver 100 according to
the present invention.

In an advantageous embodiment of the method according to
the present invention and wireless transceiver 100
according to the present invention, information 1100
received by transceiver unit 110 of wireless transceiver
100 is not associated with information queries 1000,
1001, and traffic situation reports 1200 that are
transmitted without information query 1000, 1001, for
example via a cell broadcast short message service (CBS)
of service provider 10, can also be processed. In this
case information 1100 returned by service provider 10 is
received within first predefined time period 1401 after
first information query 1000 has been transmitted.